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Apparatus for the dynamic stabilization of bones or bone
fragments, in particular spinal vertebrae

CLAIMS

- 10 1. Apparatus for the dynamic stabilization of bones or bone
fragments, in particular spinal vertebrae (V), with at
least one longitudinal support (11) that can be fixed to
the vertebrae (V),
characterized in that the at least one longitudinal support
15 (11) is so constructed that by application of a
prespecified bending force it can be plastically deformed
from a first stable shape state "A" into a second,
alternative stable shape state "B", but while in the first
as well as in the second state remains flexible within
20 predetermined limits ("elastic flexion range").
2. Apparatus according to Claim 1,
characterized in that the longitudinal support (11) is such
that when clamped at one end, while within a stable shape
state "A" or "B" it can be elastically deflected by an
angle of 5° to 12°, in particular about 8°, over a length
25 corresponding to the spacing of two adjacent vertebrae, or
about 2 to 5 cm.
3. Apparatus according to Claim 1 or 2,
characterized in that the longitudinal support (11) is
30 constructed so as to be stable, i.e. unyielding, both with
respect to anatomically usual longitudinal shear forces and
with respect to anatomically usual transverse shear forces.

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4. Apparatus according to one of the claims 1 to 3,
characterized in that the longitudinal support (11) is
constructed so as to be substantially stable with respect
to torsion.

5 5. Apparatus according to one of the claims 1 to 4,
characterized in that the longitudinal support (11) is
constructed in the shape of a flat band or strip.

6. Apparatus according to one of the claims 1 to 4,
characterized in that the longitudinal support (11) is
10 constructed so as to be rotationally symmetrical.

7. Apparatus according to one of the claims 1 to 4,
characterized in that the longitudinal support (11) is
hollow, in particular is constructed as a hollow rod.

8. Apparatus according to one of the claims 1 to 7,
15 characterized in that the longitudinal support (11)
comprises an in particular plastically deformable core (12)
made of metal, in particular titanium or a titanium alloy,
which is encased in a human-tissue-compatible plastic (13),
in particular one that ensures flexibility within a stable
20 shape state.

9. Apparatus, in particular according to one of the claims 1
to 8,
characterized in that the longitudinal support (11) is so
dimensioned that within the elastic flexion range its
25 surface stress is always below the dynamic breaking stress.

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10. Apparatus according to Claim 8 or 9,
characterized in that in the case of a longitudinal support
with core (12), both the core and the casing (13) are
dimensioned such that in the elastic flexion range the
5 surface stress of both core (12) and casing (13) is always
below the respective dynamic breaking stress.

11. Apparatus according to one of the claims 8 to 10,
characterized in that the core (12) is encased in more than
one layer.

10 12. Apparatus according to one of the claims 1 to 11,
characterized in that it comprises bone-anchoring means, in
particular pedicle screws (10), to which the longitudinal
support or supports (11) can be fixed.

15 13. Apparatus according to one of the claims 1 to 12,
characterized in that it comprises longitudinal-support-
connecting means, which can be used to connect at least two
support sections to one another.

20 14. Apparatus according to Claim 13,
characterized in that the longitudinal-support-connecting
means comprise two oppositely situated support-receiving
openings, into each of which an end section of the support
can be inserted and fixed by way of a clamping screw or
similar clamping element.

25 15. Apparatus, in particular according to one of the claims 1
to 14,
characterized in that the bone-anchoring means comprise
longitudinal-support-receiving openings that can be spaced
at variable axial distances from the opposite distal end,
so that the longitudinal support (11) can be adjusted to a
30 correspondingly different distance from the vertebra (V).

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16. Apparatus according to one of the claims 8 to 15,
characterized in that the core (12) is constructed in the
form of a flat band or strip, with a width smaller than or
equal to the corresponding dimension of the longitudinal
support.

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17. Apparatus according to one of the claims 8 to 15,
characterized in that the core (12) is rotationally
symmetrical, in particular circular, with either a constant
diameter or a diameter that varies along the length of the
longitudinal support.

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18. Apparatus according to Claim 17,
characterized in that the diameter of the core (12), at
least in sections, is continually enlarged or reduced
and/or altered in a stepwise manner, such that in the last
case the transitions in the region of a step are
constructed so as to reduce stress, in particular are
rounded.

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